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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,112	11/19/2003	Richard Hsiao	HIT1P041A/SJ0920010089US2	7020
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ZILKA-KOTAB, PC P.O. BOX 721120 SAN JOSE, CA 95172-1120			EXAMINER KLIMOWICZ, WILLIAM JOSEPH	
			ART UNIT	PAPER NUMBER
			2627	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/11/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/717,112

Applicant(s)

HSIAO ET AL.

Examiner

William J. Klimowicz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

Applicant's election without traverse of Species I in the reply filed on March 2, 2007 is acknowledged.

More specifically, in the Response filed March 2, 2007, the Applicant states: "Applicant hereby elect Species I (claims 1-21) associated with Figures 4-4G without traverse."

Claim 22 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on March 2, 2007.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The metes and bounds of claim 1, and claims dependent thereon, are indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention, in light of Applicants' disclosure as a whole.

More concretely, claim 1 is drawn to a "a ***magnetic head*** coil structure" (emphasis added) including positively recited elements that are only specifically found in an ***intermediate***

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product of a finished magnetic head, during magnetic head manufacture. That is, claim 1 (“a magnetic head coil structure”) is clearly and unquestionably drawn to an *intermediate* product *in light* of the Applicant’s disclosure.

It appears, however, that Applicant, as disclosed by the originally presented claims, is of the opinion that claim 1 does in fact encompass a completed magnetic head manufacture. This is evidenced by claim 19, which depends from and therefore includes all the positive limitations of claim 1.

Moreover, this intent is readily apparent with regard to claim 19 in particular. That is, claim 19 recites “a disk drive system, comprising: a magnetic recording disk; a magnetic head including a coil structure as recited in claim 1 . . . ” indicating that it is the Applicant’s claim 1 is encompassing a *completed* magnetic head capable of immediate use in a disk drive.

Claim 19 recites: “a disk drive system, comprising: a magnetic recording disk; a magnetic head *including a coil structure as recited in claim 1 . . .*” (emphasis added). That is claim 19, is apparently claiming both a finished product, i.e., a disk drive system, and also a product which is an intermediate product, which includes positive limitations not found in the final magnetic head structure (including, e.g., a silicon dielectric layer, a photoresist layer).

Therefore, the metes and bounds of claim 1, and claims that depend therefrom, including claim 19, are not readily ascertainable in light of the Applicant’s claimed subject matter, when viewed with Applicant’s accompanying disclosure. More concretely, is the Applicant attempting to claim an intermediate magnetic head product with a coil structure, or a completed magnetic head product? If the Applicant is indeed attempting to provide a scope of coverage for a completed magnetic head, then the positive recitations of materials found in claim 1, that are not

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found in the completed magnetic head should be eliminated. For example, “a photoresist layer” and “a silicon dielectric layer” are positively recited elements of the coil structure of claim 1, but are not found in a completed magnetic head (i.e., although such positively recited materials are used in facilitating the coil structure formation, they are removed *prior* to magnetic head completion).

The Applicant could obviate the rejections by clearly demarcating the scope of the invention, e.g., by amending claim 1 to read “A coil structure formed during the process of manufacturing a magnetic head,” or “A coil structure to be used in a magnetic head,” or other similar recitations making it clear to one of ordinary skill in the art, that the claims are drawn to an intermediate product, and not a product which is immediately used in a completed magnetic head.

Claims 15-17 are inconsistent, and thus indefinite, based on the limitations when included with the previous limitations set forth in the base independent claim 1. More specifically, claim 15 recites “wherein the conductive seed layer includes a magnetic material,” claim 16 recites “wherein the conductive material includes a magnetic material,” claim 17 recites “wherein the magnetic material is selected from the group consisting of NiFe, CoFe, and CoNiFe,” and claim 18 recites “the coil structure includes a P2 pole tip structure.”

Claim 1, from which claims 15-18 depend, recites “a conductive material formed in the at least one channel *to define a coil structure.*” Emphasis added.

It is noted, however, that claims 15-17, and to a lesser extent claim 18, are inconsistent with the language of claim 1, since claims 15-17 reference that the channels are effectively

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defining a magnetic structure (e.g., a magnetic pole) as opposed to a coil structure as required by the language of claim 1.

Thus, the metes and bounds of claims 15-18, based on the language already present and positively set forth in claim 1, from which they depend, render the claims vague and ambiguous.

The following phrase(s) lack clear antecedent basis within the claim(s), i.e., either the particularly recited passage fails to be properly introduced prior to its appearance at that point in the claim or the structure recited in the passage is not an inherent part of or component of the previously recited structure:

- (i) Claim 3 (line 1), “the conductive seed layer.”
- (ii) Claim 6 (line 1-2), “the conductive seed layer.”
- (iii) Claim 9 (line 1-2), “the slope of the at least one channel.”
- (iv) Claim 9 (line 2), “the conductive seed layer.”
- (v) Claim 15 (line 1), “the conductive seed layer.”

### ***Claim Rejections***

Insofar as the claims can be best understood in light of the Applicant’s disclosure, the following rejections, articulated in detail, are deemed *prima facie* appropriate, based on a preponderance of the evidence.

As recited **MPEP§2106**:

Office personnel are to give claims their ***broadest reasonable interpretation*** in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44

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USPQ2d 1023, 1027-28 (Fed. Cir. 1997). ***Limitations appearing in the specification but not recited in the claim are not read into the claim.*** *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (“During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow. . . . The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed. . . . An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.”). [Emphasis in bold italics added].

As set forth in the MPEP§ 706, “the standard to be applied in all cases is the ‘*preponderance of the evidence*’ test. In other words, *an examiner should reject a claim* if, in view of the prior art and evidence of record, *it is more likely than not that the claim is unpatentable.*” Emphasis in bold italics added.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6-13 and 18-21 are rejected under 35 U.S.C. 102(a) or 102(e) as being anticipated by Hsiao et al. (US 2002/0030928 A1).

As per claim 1, Hsiao et al. (US 2002/0030928 A1) discloses a magnetic head coil structure (e.g. see FIG. 15), comprising: an insulating layer (e.g., 134); a photoresist layer (138) (see, *inter alia*, paragraph [0021]) deposited on the insulating layer (134); a silicon dielectric layer (180) (see, *inter alia*, paragraph [0024]) deposited on the photoresist layer (138), the silicon dielectric layer (138) having at least one channel (184) formed therein; a conductive material (200) (see, *inter alia*, paragraph [0026]) formed in the at least one channel (184) to define a coil structure.

As per claim 2, wherein the insulating layer (134) includes  $\text{Al}_2\text{O}_3$  (see, *inter alia*, paragraph [0021]).

As per claim 3, wherein the conductive seed layer (196) includes Cu (see, *inter alia*, paragraph [0026]).

As per claim 4, wherein the conductive material includes Cu (see, *inter alia*, paragraph [0026]).

As per claim 6, wherein a resistivity of the conductive seed layer (196) is less than or equal to 8.3 micro-ohm/cm (see, *inter alia*, paragraph [0026] - note that copper has an intrinsic resistivity well known as approximately 1.72 micro-ohm/cm, and at line 2 of paragraph [0026], the seed layer is disclosed as being tantalum/copper - i.e., tantalum and/or copper.

As per claim 7, wherein the silicon dielectric layer (180) includes  $\text{SiO}_2$  (see, *inter alia*, paragraph [0024]).

As per claim 8, wherein the at least one channel includes a slope greater than one (1) (see, *inter alia*, paragraph [0027]).



As per claim 9, wherein the slope of the at least one channel facilitates depositing of the conductive seed layer (196) and the conductive material (200) (see, *inter alia*, paragraph [0026]-[0027]).

As per claim 10, wherein an aspect ratio of the at least one channel is at least 7 (see, *inter alia*, paragraph [0027]).

As per claim 12, wherein at least a portion of the silicon dielectric layer (180) has been removed - see FIG. 13.

As per claim 13, wherein the silicon dielectric layer (180) has been removed by chemical-mechanical polishing (CMP) (see, *inter alia*, paragraph [0026]).

As per claim 18, wherein the coil structure includes a P2 pole tip structure (130, 160).

As per claims 19 and 21, a disk drive system is provided, comprising: a magnetic recording disk (12); a magnetic head (240) including “a coil structure as recited in claim 1;” an actuator (see FIG. 1, depicted VCM) for moving the magnetic head (240) across the magnetic recording disk (12) so the magnetic head (240) may access different regions of the magnetic recording disk (12); and a controller (inherently provided, otherwise the disk drive would not work as intended, as is known) electrically coupled to the magnetic head (240).

As per claim 11 and per claim 20 and 21, the following is noted: The product by process limitations in these claims (e.g., “wherein the channels are formed by masking, wherein the masking includes depositing another photoresist layer” [claim 11] or “manufactured utilizing a process, comprising: depositing an insulating layer; depositing a photoresist layer on the insulating layer; depositing a silicon dielectric layer on the photoresist layer; masking the silicon dielectric layer; etching at least one channel in the photoresist layer and the silicon

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dielectric layer; depositing a conductive seed layer in the at least one channel; and filling the at least one channel with a conductive material to define a coil structure” [claim 20] are directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17(footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessman*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process limitations or steps, which must be determined in a “product by process” claim, and not the patentability of the process limitations. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not. Note that the applicant has the burden of proof in such cases, as the above case law makes clear.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsiao et al. (US 2002/0030928 A1) in view of Fujita et al. (JP 2000011323 A).

See the description of Hsiao et al. (US 2002/0030928 A1), *supra*.

As per claim 5, Hsiao et al. (US 2002/0030928 A1) remains silent with respect to a grain size of the conductive material, wherein the grain size is less than half of a smallest dimension of the at least one channel.

It is noted however, that although Hsiao et al. (US 2002/0030928 A1) remains silent with respect to wherein the grain size is less than half of a smallest dimension of the at least one channel, Hsiao et al. (US 2002/0030928 A1) does in fact set forth the dimensions of the channel as being expressly “approximately 0.25 microns to approximately 1.25 microns.” See paragraph [0027] of Hsiao et al. (US 2002/0030928 A1).

Thus, the requisite grain size to meet the limitation of claim 5 when viewed in light of the disclosure of Hsiao et al. (US 2002/0030928 A1) “is less than half of a smallest dimension of the at least one channel” - i.e., less than “approximately” 0.125 (1/2 of 0.25 microns) microns to less than “approximately” 0.625 microns (1/2 of 1.25 microns).”

Such grain size of copper coils in thin film magnetic heads is readily known.

Fujita et al. (JP 2000011323 A) discloses an analogous thin film magnetic head and coil structure wherein the grain size is less than “approximately” 0.125 (1/2 of 0.25 microns) microns to less than “approximately” 0.625 microns (1/2 of 1.25 microns).” See abstract of Fujita et al. (JP 2000011323 A).

Given the express teachings and motivations, as espoused by Fujita et al. (JP 2000011323 A), it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the grain size of Hsiao et al. (US 2002/0030928 A1) with the particular size as taught by Fujita et al. (JP 2000011323 A).

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide the grain size of Hsiao et al. (US 2002/0030928 A1) with the particular size as taught by Fujita et al. (JP 2000011323 A) in order to provide “a thin film magnetic head which can reduce time constant and enable writing with a higher frequency by reducing specific resistance of a thin film coil.” See abstract of Fujita et al. (JP 2000011323 A).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsiao et al. (US 2002/0030928 A1) in view of Brewer et al. (US 4,950,583).

See the description of Hsiao et al. (US 2002/0030928 A1), *supra*.

As per claim 14, Hsiao et al. (US 2002/0030928 A1) remains silent with respect to wherein an adhesion promoter layer is provided between the silicon dielectric layer and the photoresist layer.

Such adhesion promoting layers for prevention of peeling between the silicon layer and the photoresist material are well known and ubiquitous in the thin film deposition art.

As just one example, Brewer et al. (US 4,950,583) is cited to disclose adhesive primers/promoters such as silazanes and silanes, etc. which are used between silicon and photoresist materials to enhance adhesion therebetween and prevent the separation of such materials (e.g., see COL. 1, line 36 *et seq.*).

Given the express teachings and motivations, as espoused by Brewer et al. (US 4,950,583), it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an adhesion layer between the silicon mask and the photoresist material of Hsiao et al. (US 2002/0030928 A1).

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide an adhesion layer between the silicon mask and the photoresist material of Hsiao et al. (US 2002/0030928 A1) in order to prevent the separation of the silicon and photoresist materials, as exemplified by the teachings of the known art, exemplified by Brewer et al. (US 4,950,583).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William J. Klimowicz whose telephone number is (571) 272-7577. The examiner can normally be reached on Monday-Thursday (6:30AM-5:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Thi Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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